PORTABLE COCOA BUNCH WRAPPING DEVICE

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This report is submitted in partial fulfillment of the requirements for Bachelor of Mechanical Engineering (Design and Innovation)

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Dedicated to my beloved parents En. Jasni b. Abdullah and Pn Rahmah bt. Ali, family, supervisor En. Mohd Ruzi b. Hj Harun, and friends.

ACKNOWLEDGEMENTS

Alhamdulillah thanks to God for giving me the opportunity in order to complete the thesis on design and analysis of portable cocoa bunch wrapping device. First of all I'm Azrul Bin Jasni would like to express my fully grateful for the entire person that involves in completing my thesis writing for my final project.

For the first, thank you for my project's supervisor, Mr Mohd Ruzi Bin Hj Harun for his support and guidance for me in completing my final project. Because of him, I could implement my final project with success and going smooth without any big trouble and problem. Any suggestions, ideas, any opinions from and what ever came from him are the learning process for me as a student who needs guidance in executing my project. And also, for his own time was used to me for the helpful discussion and benefited for me.

Also I would like to impress my grateful to my family especially my parents who was giving me the support to go on further with my study and completing this final project.

ABSTRACT

Design and analysis of portable cocoa bunch wrapping device is almost like design the new product that will help the cocoa grower in order to prevent their cocoa plantation from pest insect. This device work to wrap the cocoa by using the plastic bag and help the grower to wrap the cocoa pod in short time. Besides, this device will increase the efficiency of wrapping process differ to existing product. The development of the device will be equipped by the mechanism of spring and simple clamp mechanism. This device being design for normal usage and have high durability with low cost maintenance part. Combining the mechanical system, this device is suitable to be used for farmers.

ABSTRAK

Reka bentuk dan analisis yang dijalankan terhadap produk baru iaitu pembalut buah koko adalah untuk membantu petani dalam bidang pertanian ini untuk melindungi hasil tanaman mereka daripada serangga perosak. Alat ini dibina untuk membalut buah koko dalam jangka masa yang singkat dengan menggunakan kaedah pembalut plastik. Selain itu, alat ini dibina untuk meningkatkan keupayaan dalam proses membalut buah koko berbeza dengan kaedah atau produk yang telah dihasilkan sebelum ini. Pembangunan alat ini adalah dengan menggunakan mekanisma spring dan mekanisma asas dalam pemegang alat. Alat ini dibina untuk kegunaan harian dan mempunyai daya tahan yang tinggi dengan kos yang rendah. Hasil gabungan sistem mekanikal, alat yang dibangunkan ini sangat sesuai digunakan oleh petani.

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SYMBOL DEFINITION

F ·	- Degree of	freedom
	DOLLOS OI	HOOGOIII

- Total number of links in the mechanism n
- Total number of primary joins (pins or sliding joints) j_p
- Total number of higher order joints (cam or gear joints) j_h

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Cocoa is the dried and partially fermented fatty seed of the cacao tree from which chocolate is made. In the United States, 'cocoa' often refers to cocoa powder, the dry powder made by grinding cocoa seeds and removing the cocoa butter from the dark, bitter cocoa solids. By itself it has an extremely bitter flavor.

Cocoa threat with many dangerous insects which can spoil the whole cocoa plantations. This could decrease the farmer income and some precaution methods should be implemented to prevent the cocoa from any dangerous insects.

The most popular way to prevent the cocoa fruit from this insect is by wrapping it with the plastic bag. However some device should be innovate to make the process perform more easy and reduce time. The current product which develop by Malaysian Cocoa Board, name as Eze-Jr. Sleever. This product recently used to wrap the cocoa with the plastic bag. However, this product currently used manual process which can increase time to wrap the whole acre of cocoa plantation. Some easy automate mechanism should be implemented to improve the current product.

As summary, Chico will produce the semi-automate mechanism that will help planter and improve the existing product, Ezee-Jr. Sleever.

1.2 Project Background

Project backgrounds for the project are briefly explained as below:

- This project is mainly about to design the new portable cocoa wrapping device to replace the existing product.
- The project will start from design and generate concepts and finished with fabricate the functional model.

1.3 Problem Statements

The major problem being determined to make sure the design is useful to user. The problem of this designing this "Chico" is about the mechanism that to be used to make sure this project has delivered its objective. The mechanism that been used in current product is actually does not work semi-automatically. This causes the planter which referred to the person who plant the cocoa fruit need more times to wrap the cocoa bunch.

From the studied that have been made from Malaysian Cocoa Board, they have come out with the product called Ezee-Jr. Sleever. The problems with the current product are listed below:

- a) This product have overall manual automate. The planter needs to push the wrapping plastic with rubber-band end until its hold the cocoa bunch. So, some studied have been made to improve the current product.
- b) This product is separate into two devices, which to be used for high and low branch tree.
- c) The design cause grower took more time due to no mechanism that might help the grower to take less time and attention intend to wrap the fruit.

1.4 **Objectives of Project**

On this design it have an objective to make sure it achieve its goal in order from solving some major problems in a real life situation. Some objectives that being list below are:

- a) Design and analysis the structural and mechanism of cocoa wrapping device.
- b) To shorten the manual wrapping time and increase efficiency.

1.5 Scopes of project

This project is target to be updated the current product. To achieve the objectives listed above, some guideline has been setup, below are the scope of the project:

- To study the current technique for cocoa wrapping bunch. a)
- b) Liaise with Malaysia Cocoa Board for advice and technical support.
- To generate the concept and perform concept selection methods. c)
- d) To design the device using CATIA
- To analysis the structure and calculate the mechanisms using CATIA e) Analysis.
- f) Fabricate the design.

1.6 **Project Methodology**

Project methodology shows the process flow of the project throughout the whole final year. In this section the flow of the project currently illustrate in (Figure 1.6).

The process started with the proposal of the project and follow with making the planning for the project. Some research being made to find the idea that might illustrated to help in order to improve the current mechanism. In this research stage, the overall view of the current product will clearly viewed.

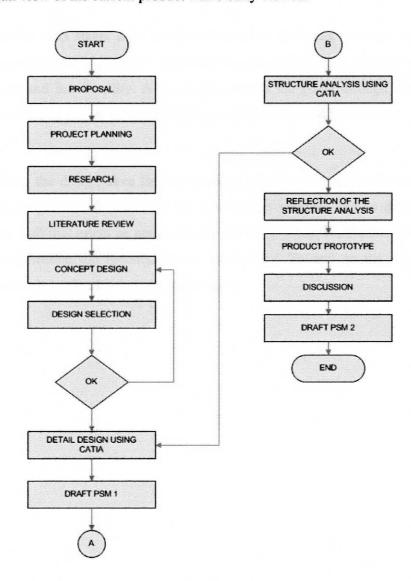


Figure 1.6: PSM Flow Chart

In the next stage, the project continued to the literature review stage. In this stage, all the data and information being collected that might help to come out with the idea to generalize the concept design. The information about the concept scoring and screening, structure analysis and overall about the existing product are search during this stage. In order to get the information, some researches and liaising with the concern government being made, like Malaysian Cocoa Board. Furthermore, information from the website and book are important to get the idea to generate the design concept and generate the mechanism.

In the next stage, after all the information collected, concepts of the new design made. About 20 concepts are made throughout this stage in order to vary the mechanism and functionality. After all the concept are going through the selection stage, the selected design is been detailing using CATIA V5R10 software.

Once the design have finished through the detail design stage, the analysis made to analyze the structure of the new design concept and to determine the maximum load that might be applied to the structure. Then, simulation of the design made to determine the function of the mechanism. To end up the design stage, prototype made to clearly view the mechanism.

1.7 **Thesis Outline**

In this part will summarize all the chapters contain in this first draft.

Chapter 1 contains the introduction, problem statement, objective, and scope of project. It summarizes the basic information about the project which will be performed and the objective of this project.

Chapter 2 concludes all the research that has been done to provide ideas and specification as a guideline to produce the design.

Chapter 3 explains all the studied that have been performed throughout the existing product Ezee-Jr Sleever.

Chapter 4 concludes the process in selection the concepts and the detail design of the selected concept.

Chapter 5 contains the analysis and some calculation that perform to differ between the experimental and theoretical data.

Chapter 6 will discuss about all finding throughout chapter 3 until chapter 5.

Chapter 7 is the final chapter for the thesis which contains the conclusion of this project and the recommendation for the future work for this project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, some researches have been performed to obtain some information which might able to help to perform the final project and design the concept. More over, all this information gain shall guide me throughout this project and make me know the client or customer needs and solve their problems.

2.2 **Overview of Selection Methodology**

We present a two-stage concept selection methodology, although the first stage may suffice for simple design decisions. The first stage is called concept screening and the second stage is called concept scoring [1]. Each is supported by a decision matrix which is used by the team to rate, ranks, and selects the best concept(s). Although the method is structured, we emphasize the role of group insight to improve and combine concepts.

Concept selection is often performed in two stages as a way to manage the complexity of evaluating dozens of product concepts. Screening is a quick, approximate evaluation aimed at producing a few viable alternatives. Scoring is a more careful analysis of these relatively few concepts in order to choose the single concept most likely to lead to product success.

During concept screening, rough initial concepts are evaluated relative to a common reference concept using the screening matrix. At this preliminary stage, detailed quantitative comparisons are difficult to obtain and may be misleading, so a coarse comparative rating system is used. After some alternatives are eliminated, the team may choose to move on to concept scoring and conduct more detailed analyses